

UNITED STATES PATENT APPLICATION

by

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For

**DISCHARGE SPACE STRUCTURE OF PLASMA DISPLAY
PANEL AND METHOD OF FABRICATING ITS BARRIER**

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BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a plasma display panel (referred to hereinafter as PDP) and, more particularly, to a discharge space structure of a PDP and method of fabricating its barrier, in which the center of each discharge space formed by barriers has a height different from that of the boundary between discharge spaces adjacent to each other, to prevent undesirable discharge from occurring in neighboring cells when address discharge between a sustain electrode and address electrode is carried out.

Discussion of Related Art

Fig. 1 shows a structure of a conventional three-electrode plane discharge PDP. Referring to Fig. 1, the PDP is composed of the front substrate 1 for displaying pictures and back substrate 2 arranged in parallel with the front substrate 1, having a specific distance from each other. The front substrate 1 has a plurality of sustain electrode lines 6 in a certain interval, a dielectric layer 8 formed on a plurality of sustain electrode lines 6 to restrict discharge current, and a protective layer 9 formed on dielectric layer 8 to protect sustain electrode lines 6. The back substrate 2 has a plurality of barriers 3 for forming a plurality of discharge spaces, a plurality of address electrode lines 4 formed between barriers 3, perpendicular to sustain electrode lines 6, and a fluorescent layer 5 formed on both sides of barriers 3 so as to cover address electrode lines 4, to emit a visible ray during discharge.

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between cells which vertically lie adjacent to each other, and thus visible rays generated by the fluorescent layer intrude into each other in the same stripe during ultraviolet rays discharge, creating color spread. This deteriorates color purity.

SUMMARY OF THE INVENTION

5 Accordingly, the present invention is directed to a discharge space structure of a PDP and method of fabricating its barrier that substantially obviates one or more of the problems due to limitations and disadvantages of the related art.

10 An object of the present invention is to provide a discharge space structure of a PDP and method of fabricating its barrier, in which the center region of each discharge space formed by barriers has the height different from that of the boundary region between discharge spaces adjacent to each other, so as to prevent undesirable discharge from occurring in neighboring cells, to remove color spread in the same stripe during address discharge between a sustain electrode and an address electrode, and to effectively use a generated visible ray.

15 To accomplish the object of the present invention, there is provided a discharge space structure of a plasma display panel including first and second substrates opposite each other, a barrier layer formed on the first substrate and having a plurality of raised portions, and a plurality of discharge spaces, each space being formed between the barrier layer and the second substrate, and being at least partially defined by at least two adjacent raised portions of the barrier layer.

20 A method of making the barrier layer of the plasma display device includes coating a barrier material layer on a substrate, forming a photosensitive layer on the barrier material layer, exposing the photosensitive layer to light through a mask, the mask having a pattern

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corresponding to cells of the plasma display device, and etching the barrier material layer to form said plurality of cells.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE ATTACHED DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention:

In the drawings:

Fig. 1 is a perspective view of the front and back substrates of a conventional PDP;

Fig. 2 is a cross-sectional view of the conventional PDP;

Fig. 3 is a cross-sectional view of the discharge space of the conventional PDP;

Fig. 4 is a cross-sectional view showing a process of forming the barrier of the conventional PDP;

Fig. 5 is a cross-sectional view of the discharge space of a PDP according to the present invention;

Figs. 6A, 6B and 6C are cross-sectional views showing a process of forming the barrier of the PDP according to the present invention;

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Fig. 7 is a view showing a mask employed for forming the barrier according to the present invention; and

Figs. 8A and 8B show discharge space structures according to another embodiment of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

The discharge space structure according to the present invention is described below with reference to Fig. 5. As shown in Fig. 5, a PDP of the present invention is constructed in such a manner that the front substrate 101 and back substrate 102 are combined, a dielectric layer 108 is formed on sustain electrodes 106 arranged on the front substrate 101, a protective layer 109 is formed on dielectric layer 108, address electrodes 104 are arranged on the back substrate 102, barriers 103 are formed between address electrodes 104, and a fluorescent layer 105 is formed on the inner walls of barriers 103. A discharge space P formed by fluorescent layer 105 which is formed between barriers 103 and has a hemispheric shape. Fluorescent layer 105 is formed with a certain height at boundary A between cells in the same stripe and its height is gradually reduced from boundary A to the center of each cell. Though fluorescent layer 105 is formed in a hemispherical shape in this embodiment, fluorescent layer 105 and sides of barrier 103 can have any shapes if discharge space P is formed in a shape similar to a plasma formation shape.

A method of forming the barrier to obtain the discharge space structure shown in Fig. 5 is explained below with reference to Figs. 6A, 6B and 6C. Referring to Fig. 6A, a barrier material

103 is coated on back substrate 102 on which the electrodes are formed. Referring to Fig. 6B, photoresist 112 is coated on barrier material layer 103, and exposure is performed to the back substrate on which barrier material layer 103 is coated using a mask shown in Fig. 7. Referring to Fig. 6C, the barrier material layer is developed and etched, to form barrier 103. The mask used for the exposure process has a horizontal pattern 110 for exposing the barrier, and a vertical pattern 111 for forming boundary region A between neighboring cells in the same stripe, which is perpendicular to the horizontal patterns.

The operation of the PDP according to the present invention is explained below. When voltage of above 100V is applied between electrodes of the front and back substrates to drive the display panel, ultraviolet ray discharge is generated between a couple of sustain electrode 106 and address electrode 104. When a visible ray is emitted from R,G,B fluorescent materials of fluorescent layer 105 while the plasma forming region P of the discharge space is as shown in Fig. 5, this visible ray is not diffused into neighboring cells in the same stripe but emitted to the front of the panel.

Figs. 8A and 8B show discharge space structures according to another embodiment of the present invention. Fig. 8A shows that the portion of fluorescent layer 105 corresponding to each discharge space has a semi-elliptical shape and Fig. 8B shows that a certain area of the center of fluorescent layer 105 is flat. As described above, according to the present invention, color spread due to diffusion of visible ray between cells is prevented, resulting in improvement in luminance of the PDP.

It will be apparent to those skilled in the art that various modifications and variations can be made in the discharge space structure of a PDP and method of fabricating its barrier of the

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present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

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